4.1.3 Classwork

Name_____ Date_____

How can I graph it quickly?
Graphing a parabola without a table

Today's big goal Graph quadratic equations without making tables and rewrite quadratic equations from standard form into graphing form.

4-34 Transforming Graphs

Locate the "Transforming Parabolas" dynamic tool at: www.cpm.org/flash/technology/transform_parabolas.swf.

➔***Click on "change parameter h" and "change parameter k"***

- Compared with $y = x^2$, identify which parameter (a, h, k) affects:
  - Orientation: _____
  - Vertical shift: _____
  - Horizontal shift: _____
- What values stretch the graph vertically? Compress the graph horizontally? _____
  - Why do those values have these impacts?

- What values cause the graph to flip vertically? _____
- What values cause the graph to shift to the left? To the right? _____
  - More importantly, why?

- What values cause the graph to shift up or down? _____
  - More importantly, why?

- Are there points on your graph that connect to specific parameters in the equation? Explain.

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	Equation	Coordinates of vertex	Orientation	Vertical stretch or compression of $y = x^2$?	Quick graph
a	$y = (x+9)^2$				
b	$y = x^2 + 7$				
c	$y = 3x^2$				
d	$y = \frac{1}{3}(x-1)^2$				
e	$y = -(x-7)^2 + 6$				
f	$y = 2(x+3)^2 - 8$				

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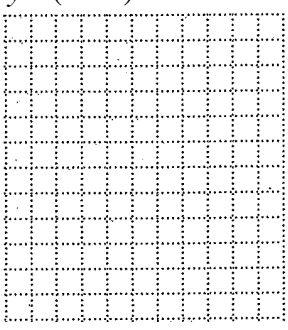
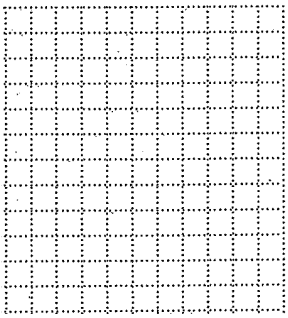
Graph each equation below without making a table or using your graphing calculator. Look for ways to go directly from the rule to the graph. What information did you need to make a graph without using a table? How did you find that information from the equation? Be ready to share your **strategies** with the class.

a. $y = (x-7)^2 - 2$



Strategies used to graph without a calculator:

b. $y = 0.5(x+3)^2 + 1$



Strategies used to graph without a calculator:

4-37 **Read aloud from e-book**

Graphing form: $y = a(x-h)^2 + k$

How can you make a graph without a table when the equation is given in **standard form** $y = ax^2 + bx + c$?

a. What is the orientation of $y = 2x^2 + 4x - 30$? That is, does it open upward or open downward?

How could you change the equation to make the graph open the opposite way?

b. What is the stretch factor of $y = 2x^2 + 4x - 30$? **Justify** your answer.

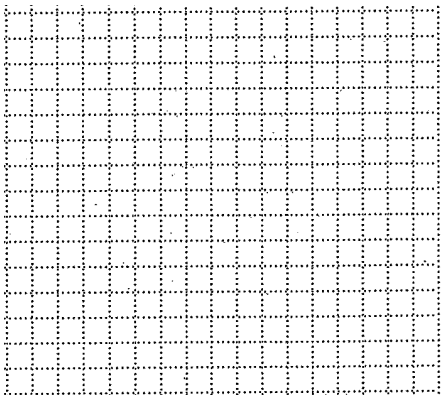
c. Can you identify the vertex of $y = 2x^2 + 4x - 30$ by looking at the equation? If not, talk with your team about **strategies** you could use to find the vertex without using a table or graphing calculator.
*Apply your new **strategy** to the problem or if you are stuck, consider the hints below:*

i. What are the x-intercepts of the parabola?

ii. Where is the vertex located in relation to the x-intercepts? Can you use this relationship to find the x coordinate of the vertex?

iii. Use the x-coordinate of the vertex to find its y-coordinate.

d. Make a quick graph of $y = 2x^2 + 4x - 30$ and write its equation in graphing form: _____



Strategy to find vertex without a table or calculator: